

**DCID 2004 TEHAMA CO. EXTRACTION PERMIT  
SUMMARY REPORT**

**APPENDIX E:  
WATER QUALITY RESULTS**

2004 DCID Water Quality Field Data					
Date	Time	Location		EC	Temp.
7/23/2004	8:10 AM	Pilot Well at Discharge Line		138	61.5
8/17/2004	9:05 AM	Pilot Well at Discharge Line		143	61.5
9/1/2004	7:30 AM	Pilot Well at Discharge Line		141	61.5
9/14/2004	2:00 PM	Pilot Well at Discharge Line		140	61.5
7/23/2004	8:10 AM	DCID Canal upstream from Pilot Well Discharge		146	72.9
8/17/2004	9:05 AM	DCID Canal upstream from Pilot Well Discharge		161	71.0
9/1/2004	7:30 AM	DCID Canal upstream from Pilot Well Discharge		158	71.5
9/14/2004	2:00 PM	DCID Canal upstream from Pilot Well Discharge		155	71.8

Note: EC is reported in microseimens per liter. Temp is reported in degrees Farenheit

**Table 1. Field Measurements of Temperature and Electrical Conductivity at the Pilot Well and the DCID Canal Upstream from the Pilot Well Discharge.**

DCID 2004 Water Quality Data; Minerals						
WATER QUALITY CONSTITUENTS	SAMPLE DATE, TIME AND LOCATION					
	8/18/2004			9/15/2004		
	Canal US	Pilot Well	Canal DS	Canal US	Pilot Well	Canal DS
<b>MINERALS</b>	9:25 am	9:15 am	9:35 am	12:30 pm	12:45 pm	1:00 pm
Temp C	23.6	16.2	21.4	21.0	16.5	19.1
Temp. F	74.5	61.6	70.5	69.8	61.7	66.4
pH (field)	8.2	8.0	8.2	8.2	8.0	8.2
pH (lab)	6.9	6.5	7.0	8.0	7.9	8.1
EC (field)	155	125	150	162	43	164
Dissolved K (mg/L)	2	1.7	1.9	1.4	1.7	1.8
Dissolved Na (mg/L)	11	9	10	9	9	11
Dissolved CA (mg/L)	11	11	11	8	12	13
Dissolved Mg (mg/L)	7	9	7	7	9	8
Total Alkalinity (as CaCO <sub>3</sub> )	75	80	72	73	79	74
SAR	0.6	0.5	0.6	0.6	0.5	0.6
ASAR	0.8	0.6	0.7	0.6	0.6	0.7
Dissolved SO <sub>4</sub> (mg/L)	2	1	2	3	1	2
Dissolved Cl (mg/L)	11	3	4	8	3	5
Dissolved NO <sub>3</sub> (mg/L)	0.03	0.1	0.04	0.46	1.4	1.2
Total Dis. Solids (@ 180 F)	108	106	110	107	110	109
Dis. Hardness (mg/L as CaCO <sub>3</sub> )	56	60	56	41	65	56
Total Hardness (mg/L as CaCO <sub>3</sub> )	56	65	56	59	67	65
Dissolved Boron (mg/L)	0.3	<0.1	0.1	0.1	<0.1	0.1
Dis. Carbonate (mg/L)	<1	68	<1	<1	<0.1	<1
Dis. Bicarbonate (mg/L)	75	488	72	73	79	74
Dis. Hydroxide (mg/L)	<1	1	<1	<1	<1	<1

**Table 2. DCID 2004 Water Quality Data; Minerals Analysis form the Pilot Well, the DCID Canal Upstream and DCID Canal Downstream of the Pilot Well Discharge.**

DCID 2004 Water Quality Data; Metals and Nutrients						
WATER QUALITY CONSTITUENTS	SAMPLE DATE, TIME AND LOCATION					
	8/18/04 0:00			9/15/04 0:00		
	Canal US	Pilot Well	Canal DS	Canal US	Pilot Well	Canal DS
<b>METALS (total)</b>	9:25 am	9:15 am	9:35 am	12:30 pm	12:45 pm	1:00 pm
Aluminum ( $\mu\text{g/L}$ )	129	3.36	66.7	76.7	2.8	297
Arsenic ( $\mu\text{g/L}$ )	8.21	1.87	5.66	9.00	1.91	7.7
Cadmium ( $\mu\text{g/L}$ )	<0.004	<0.004	<0.004	<0.045	<0.004	<0.045
Chromium ( $\mu\text{g/L}$ )	0.79	0.73	0.94	0.49	0.5	1.21
Copper ( $\mu\text{g/L}$ )	0.77	0.27	0.65	0.39	<0.186	0.82
Iron ( $\mu\text{g/L}$ )	145	<3.29	76.8	108	<4.29	340
Lead ( $\mu\text{g/L}$ )	0.049	<0.002	0.025	0.043	<0.005	0.131
Manganese ( $\mu\text{g/L}$ )	6.47	0.15	3.58	5.07	0.09	17.6
Nickel ( $\mu\text{g/L}$ )	0.62	0.3	0.47	0.51	0.23	0.71
Selenium ( $\mu\text{g/L}$ )	<0.254	<0.254	<0.254	<0.172	0.24	<0.172
Zinc ( $\mu\text{g/L}$ )	0.35	0.05	0.22	0.29	0.04	0.74
Ag (Silver) ( $\mu\text{g/L}$ )	<0.086	<0.02	<0.086	<0.084	<0.84	<0.084
<b>NUTRIENTS</b>	<b>Canal US</b>	<b>Pilot Well</b>	<b>Canal DS</b>	<b>Canal US</b>	<b>Pilot Well</b>	<b>Canal DS</b>
Dis. NO <sub>2</sub> +NO <sub>3</sub> (mg/L)	0.03	0.1	0.04	0.46	1.4	1.2
Dis NH <sub>3</sub> (mg/L)	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Dis. Ortho-PO <sub>4</sub> (mg/L)	0.01	0.05	0.02	<0.01	0.04	0.02
Total Phosphorous (mg/L)	0.02	0.04	0.03	0.02	0.04	0.02

  

Constituent or Parameter (Synonym)	Water Quality Objective or Promulgated Criterion	Recommended Numerical Limits			G = Groundwater IS = Inland Surface Water
		Source / Averaging Period	Limit	Units	
Ammonia (Ammonium)	Tastes and Odors	Odor threshold (Amoore and Hautala)	1500	$\mu\text{g/L}$	G & IS
	Toxicity - humans	USEPA Draft Health Advisory	30,000	$\mu\text{g/L}$	G & IS
	Toxicity - aquatic life	USEPA National Ambient Water Quality Criteria see Page 17 tat			IS
Chloride	Chemical Constituents	California Secondary MCL	250,000	$\mu\text{g/L}$	G & IS
		Water Quality for Agriculture (Ayers & Westcot)	106,000	$\mu\text{g/L}$	G & IS
	Tastes and Odors	California Secondary MCL	250,000	$\mu\text{g/L}$	G & IS
	Toxicity - aquatic life	USEPA National Ambient WQ Criteria / 4-day average	230,000	$\mu\text{g/L}$	IS
Nitrate (expressed as nitrogen)	Chemical Constituents	USEPA National Ambient WQ Criteria / 1-hour average	860,000	$\mu\text{g/L}$	IS
	Toxicity - humans	California Primary MCL	10,000	$\mu\text{g/L}$	G & IS
pH	Chemical Constituents	California Public Health Goal for Drinking Water	10,000C	$\mu\text{g/L}$	G & IS
		California Primary MCL	6.5 to 8.5	units	G & IS
	Tastes and Odors	Water Quality for Agriculture (Ayers & Westcot)	6.5 to 8.4	units	G & IS
	Toxicity - aquatic life	USEPA National Ambient WQ Criteria / taste & odor	5 to 9	units	G & IS
Sodium	Chemical Constituents	USEPA National Ambient WQ Criteria / Inst Min & M:	6.5 to 8	units	IS
		Water Quality for Agriculture (Ayers & Westcot)	69	$\text{mg/L}$	G & IS
	Tastes and Odors	Taste and odor threshold (USEPA Drinking Water Advisory)	30 to 60	$\text{mg/L}$	G & IS
Specific conductance (Electrical Conductivity)	Chemical Constituents	USEPA draft Drinking Water Advisor	20	$\text{mg/L}$	G & IS
		Water Quality for Agriculture (Ayers & Westcot)	900	$\text{umhos/cm}$	G & IS
	Tastes and Odors	Water Quality for Agriculture (Ayers & Westcot)	700	$\text{umhos/cm}$	G & IS
		Basin Plan for Feather River	150	$\text{umhos/cm}$	IS
Sulfate	Chemical Constituents	California Secondary MCL	900	$\text{umhos/cm}$	G & IS
		Water Quality for Agriculture (Ayers & Westcot)	250	$\text{mg/L}$	G & IS
	Tastes and Odors	California Secondary MCL (upper level)	500	$\text{mg/L}$	G & IS
	Toxicity - humans	USEPA Proposed MCL Go <sub>e</sub>	250	$\text{mg/L}$	G & IS
Total Dissolved Solids (TDS)	Chemical Constituents	California Secondary MCL	500,000	$\mu\text{g/L}$	G & IS
		Water Quality for Agriculture (Ayers & Westcot)	450,000	$\mu\text{g/L}$	G & IS
	Tastes and Odors	California Secondary MCL	500,000C	$\mu\text{g/L}$	G & IS

*Note: Table is Based on a Compilation of Water Quality Goals established by California Regional Water Quality Control Board, Central Valley Region.*

(a) For surface waters, this limit may be preempted by a California Toxics Rule or National Toxics Rule criterion.

(b) Assumes 70 kg body weight and 2 liters per day drinking water consumption.

(c) Assumes 70 kg body weight, 2 liters per day drinking water consumption, and 20 percent relative source contribution. An additional uncertainty factor of 10 is used for Class C carcinogens.

(d) Applies to "TCDD Equivalents" calculated from the concentrations of 2,3,7,8-chlorinated dibenzodioxins and 2,3,7,8-chlorinated dibenzofurans and their corresponding toxic equivalency factors (TEFs).

(e) Applies separately to Aroclors 1242, 1254, 1221, 1232, 1248, 1260, and 1016.

(f) USEPA, Region 9 has allowed acid soluble to account for suspended clay particles in receiving water.

(g) Potency Equivalency Factors, published by the Cal/EPA Office of Environmental Health Hazard Assessment, relate the relative cancer potencies of various polynuclear aromatic hydrocarbons to that of benzo(a)pyrene.

CTR California Toxics Rule  
MFL Million fibers per liter; limited to fibers longer than 10  $\mu\text{m}$ .  
NTR National Toxics Rule

Table 4. RWQCB Recommended Limits for Physical, Nutrient and Mineral Parameters.

Constituent or Parameter (Synonym)	Water Quality Objective or Promulgated Criterion	Recommended Numerical Limits			G = Groundwater IS = Inland Surface Water
		Source / Averaging Period	Limit	Units	
Aluminum	Chemical Constituents	California Primary MCL	1000	ug/L	G & IS
		California Secondary MCL	200	ug/L	G & IS
		Water Quality for Agriculture (Ayers & Westcot)	5000	ug/L	G & IS
	Tastes and Odors	California Secondary MCL	200	ug/L	G & IS
	Toxicity - humans	California Public Health Goal for Drinking Water	600	ug/L	G & IS
	Toxicity - aquatic life	USEPA National Recomm. WQ Criteria / 4-day avg (total) (f)	87	ug/L	IS
		USEPA National Recomm. WQ Criteria / 1-hour avg (total)	750	ug/L	IS
Arsenic	Chemical Constituents	California Primary MCL	50	ug/L	G & IS
		USEPA Primary MCL	10	ug/L	G & IS
		Water Quality for Agriculture (Ayers & Westcot)	100	ug/L	G & IS
	Toxicity - humans	Cal/EPA Cancer Potency Factor as a drinking water level (b)	0.023	ug/L	G & IS
		USEPA National Ambient Water Quality Criteria	0.018	ug/L	IS
Cadmium	CTR - aquatic life	California Toxics Rule (USEPA) / 4-day average (dissolved)	150	ug/L	IS
		California Toxics Rule (USEPA) / 1-hour average (dissolved)	340	ug/L	IS
	Chemical Constituents	California Primary MCL	5	ug/L	G & IS
Chromium (III)		Water Quality for Agriculture (Ayers & Westcot)	10	ug/L	G & IS
	Toxicity - humans	California Public Health Goal for Drinking Water	0.07	ug/L	G & IS
	NTR - aquatic life	California Toxics Rule (USEPA)	see Page 19 tab		IS
Chromium (VI)	Chemical Constituents	California Primary MCL	see Cr (total)		G & IS
		Water Quality for Agriculture (Ayers & Westcot)	100	ug/L	G & IS
	Toxicity - humans	USEPA IRIS Reference Dose (c)	21	ug/L	G & IS
	CTR - aquatic life	California Toxics Rule (USEPA) / 4-day average (dissolved)	11	ug/L	IS
Chromium (total)	Chemical Constituent:	California Primary MCL	50	ug/L	G & IS
		Water Quality for Agriculture (Ayers & Westcot)	1300	ug/L	G & IS
Copper	Chemical Constituents	California Secondary MCL	1000	ug/L	G & IS
		Water Quality for Agriculture (Ayers & Westcot)	200	ug/L	G & IS
	Tastes and Odors	California Secondary MCL	1000	ug/L	G & IS
	Toxicity - humans (a)	California Public Health Goal for Drinking Water	170	ug/L	G
	CTR - humans	California Toxics Rule (USEPA) for sources of drinking water	1300	ug/L	IS
Iron	CTR - aquatic life	California Toxics Rule (USEPA)	see Page 23 tab		IS
	Chemical Constituents	California Secondary MCL	300	ug/L	G & IS
		Water Quality for Agriculture (Ayers & Westcot)	5000	ug/L	G & IS
Lead	Tastes and Odors	California Secondary MCL	300	ug/L	G & IS
	Toxicity - aquatic life	USEPA National Ambient W Q Criteria / 4-day average	1000	ug/L	IS
	CTR - aquatic life	California Toxics Rule (USEPA)	see Page 24 tab		IS
Manganese	Chemical Constituents	California Secondary MCL	15	ug/L	G & IS
		Water Quality for Agriculture (Ayers & Westcot)	5000	ug/L	G & IS
	Toxicity - humans	California Public Health Goal for Drinking Water	2	ug/L	G & IS
Mercury (see also Methylmercury)	CTR - aquatic life	California Toxics Rule (USEPA)	see Page 24 tab		IS
	Chemical Constituents	California Primary MCL	50	ug/L	G & IS
		Water Quality for Agriculture (Ayers & Westcot)	200	ug/L	G & IS
Methylmercury	Tastes and Odors	California Secondary MCL	50	ug/L	G & IS
	Toxicity - humans	California DHS Action Level for drinking water	500	ug/L	G & IS
	CTR - human:	California Toxics Rule (USEPA) for sources of drinking water	0.05	ug/L	IS
Nickel	Chemical Constituents	California Primary MCL	2	ug/L	G & IS
	Toxicity - humans (a)	California Public Health Goal for Drinking Water	1.2	ug/L	G
	Toxicity - aquatic life	USEPA National Ambient W Q Criteria / 4-day average	0.77	ug/L	IS
		USEPA National Ambient W Q Criteria / 1-hour average	1.4	ug/L	IS
Selenium	CTR - human:	California Toxics Rule (USEPA) for sources of drinking water	0.05	ug/L	IS
	Toxicity - humans	USEPA IRIS Reference Dose (c)	0.07	ug/L	G & IS
		USEPA National Ambient W Q Criteria (fish tissue)	0.3	mg/kg	IS
Silver	Chemical Constituents	California Primary MCL	100	ug/L	G & IS
		Water Quality for Agriculture (Ayers & Westcot)	200	ug/L	G & IS
	Toxicity - humans (a)	California Public Health Goal for Drinking Water	12	ug/L	G
	CTR - humans	California Toxics Rule (USEPA) for sources of drinking water	610	ug/L	IS
Zinc	CTR - aquatic life	California Toxics Rule (USEPA) dissolved	see Page 25 tab		IS
	Chemical Constituents	California Primary MCL	50	ug/L	G & IS
		Water Quality for Agriculture (Ayers & Westcot)	20	ug/L	G & IS
	Toxicity - humans	USEPA IRIS Reference Dose (c)	35	ug/L	G & IS
	NTR - aquatic life	National Toxics Rule (USEPA) / 4-day average (total)	5	ug/L	IS
		National Toxics Rule (USEPA) / 1-hour average (total)	20	ug/L	IS
	Tastes and Odors	California Secondary MCL	100	ug/L	G & IS
	Toxicity - humans	USEPA IRIS Reference Dose (c)	35	ug/L	G & IS
	CTR - aquatic life	California Toxics Rule (USEPA)	see Page 28 tab		IS
	Chemical Constituents	California Secondary MCL	5000	ug/L	G & IS
		Water Quality for Agriculture (Ayers & Westcot)	2000	ug/L	G & IS
	Tastes and Odors	California Secondary MCL	5000	ug/L	G & IS
	Toxicity - humans	USEPA IRIS Reference Dose (c)	2100	ug/L	G & IS
		California Toxics Rule (USEPA)	see Page 30 tab		IS
	CTR - aquatic life	California Toxics Rule (USEPA)	see Page 30 tab		IS

**Note: Based on a Compilation of Water Quality Goals established by California Regional Water Quality Control Board, Central Valley Region**

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  - (b) Assumes 70 kg body weight and 2 liters per day drinking water consumption.
  - (c) Assumes 70 kg body weight, 2 liters per day drinking water consumption, and 20 percent relative source contribution. An additional uncertainty factor of 10 is used for Class C carcinogens.
  - (d) Applies to "TCDD Equivalents" calculated from the concentrations of 2,3,7,8-chlorinated dibenzodioxins and 2,3,7,8-chlorinated dibenzofurans and their corresponding toxic equivalency factors (TEFs).
  - (e) Applies separately to Aroclors 1242, 1254, 1221, 1232, 1248, 1280, and 1016.
  - (f) USEPA, Region 9 has allowed acid soluble to account for suspended clay particles in receiving water.
  - (g) Potency Equivalency Factors, published by the Cal/EPA Office of Environmental Health Hazard Assessment, relate the relative cancer potencies of various polynuclear aromatic hydrocarbons to that of benzo(a)pyrene.
- CTR California Toxics Rule  
MFL Million fibers per liter, limited to fibers longer than 10 um.  
NTR National Toxics Rule

**Table 5. RWQCB Recommended Numerical Water Quality Limits For Metals.**